(12) **UK Patent Application** (19) **GB** (11) **2 399 928** (13) **A**

(43) Date of A Publication 29.09.2004

(21)	Application No:	0306731.1	(51)	INT CL7: H04M 11/04 // G08B 21/02
(22)	Date of Filing:	24.03.2003		

(71) Applicant(s):
NEC Technologies (UK) Limited
(Incorporated in the United Kingdom)
**Level 3, Imperium, Imperial Way,
READING, Berks, RG2 0TD,
United Kingdom**

(72) Inventor(s):
Martin Henelly

(74) Agent and/or Address for Service:
**Reddie & Grose
16 Theobalds Road, LONDON, WC1X 8PL,
United Kingdom**

(52) UK CL (Edition W):
G4N NCM NDAX NEAX NFFV N6H

(56) Documents Cited:
DE 020007647 U1   DE 019629535 A1
DE 019532103 A1   DE 010123893 A1
DE 010004035 A1   JP 2001053905 A
NL 009400475 A   US 6359560 B1
US 20030021424 A1

(58) Field of Search:
UK CL (Edition V) **G4N, H4K**
INT CL7 **G08B, H04M**
Other: **ONLINE: EPODOC, WPI, JAPIO**

(54) Abstract Title: **Baby or child monitor incorporating mobile telephone**

(57)   A child or baby monitor comprising a transmitter terminal which monitors an activity of the baby or child, and a receiver for a parent which receives the transmitted signals. The transmitter and receiver communicate via a public radio communications network. The transmitter and/or the receiver may comprise a mobile telephone. The transmitter transmits signals in response to the monitored activity and is only activated when the detected activity exceeds a predefined limit. The transmitter terminal may have a microphone for detecting audio activity or a video camera for detecting visual activity, e.g. movement. The transmitter may also include a buffer which records the detected audio or visual data. The signal transmitted by the transmitter may be in the form of an SMS message, text message or an email, and may also include the data which is stored in the buffer.
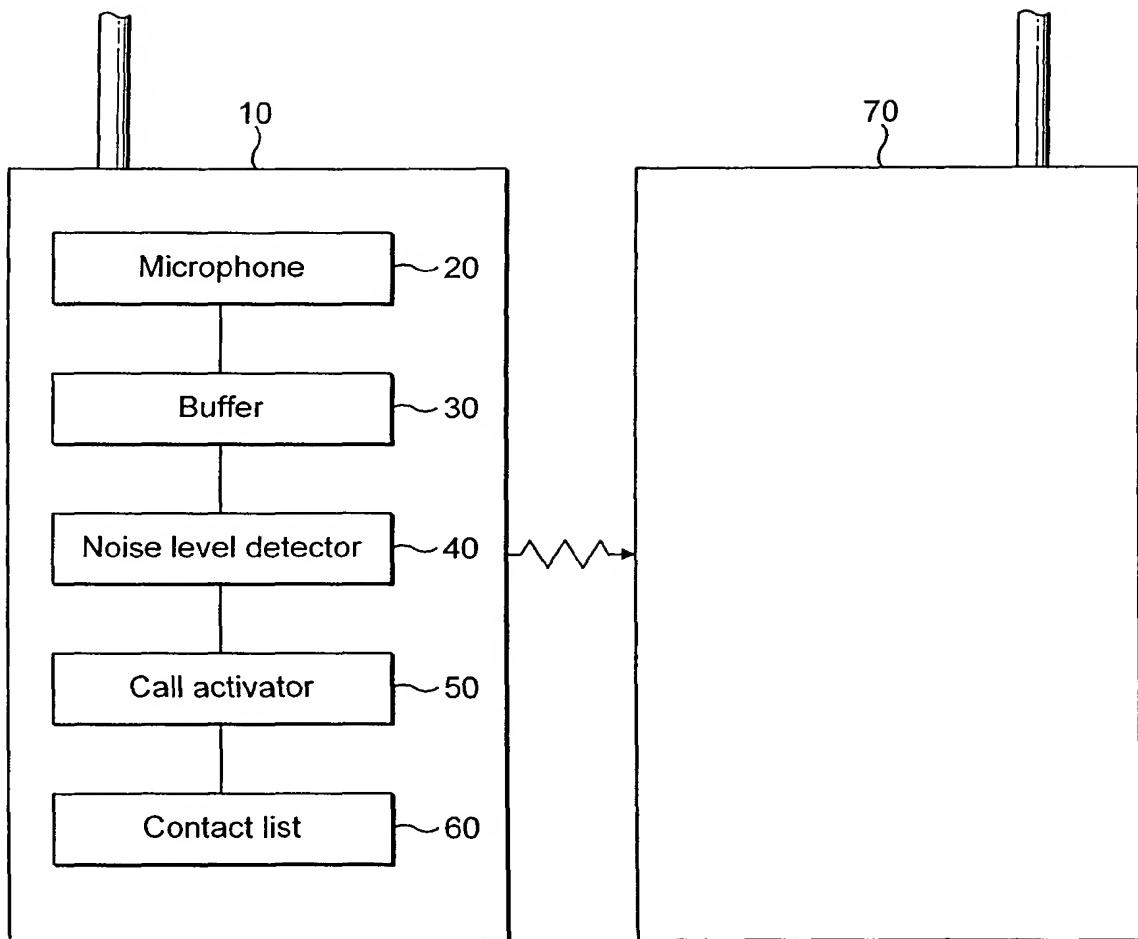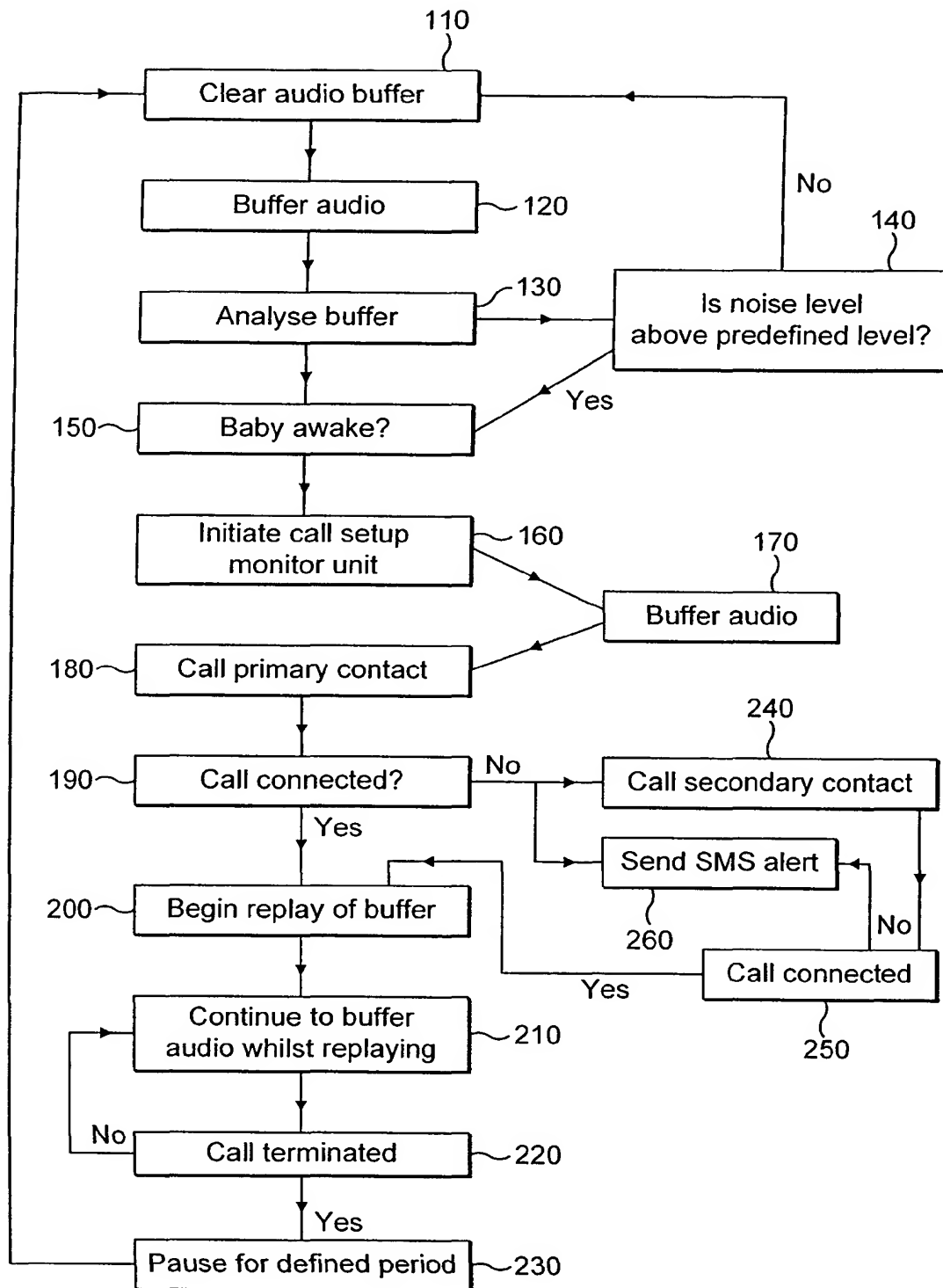
GB 2 399 928 A

At least one drawing originally filed was informal and the print reproduced here is taken from a later filed formal copy.
Original Printed on Recycled Paper

FIG. 1

110

Clear audio buffer

Buffer audio — 120

Analyse buffer — 130

150 — Baby awake?

Is noise level above predefined level? — 140

No

Yes

Initiate call setup monitor unit — 160

Buffer audio — 170

180 — Call primary contact

190 — Call connected?

No

Call secondary contact — 240

Yes

Send SMS alert

260

No

200 — Begin replay of buffer

Yes

Call connected — 250

Continue to buffer audio whilst replaying — 210

No

Call terminated — 220

Yes

Pause for defined period — 230

FIG. 2

Incoming call from
baby monitor ~300

Attempt to contact
primary user ~310

Is line busy? ~320 → Advise of call ~330
Yes

No

Has user selected
Automatic answer? ~340 → Play buffer ~350
Yes

No

Has user answered within
predefined No. of rings ~360 → Play buffer ~370
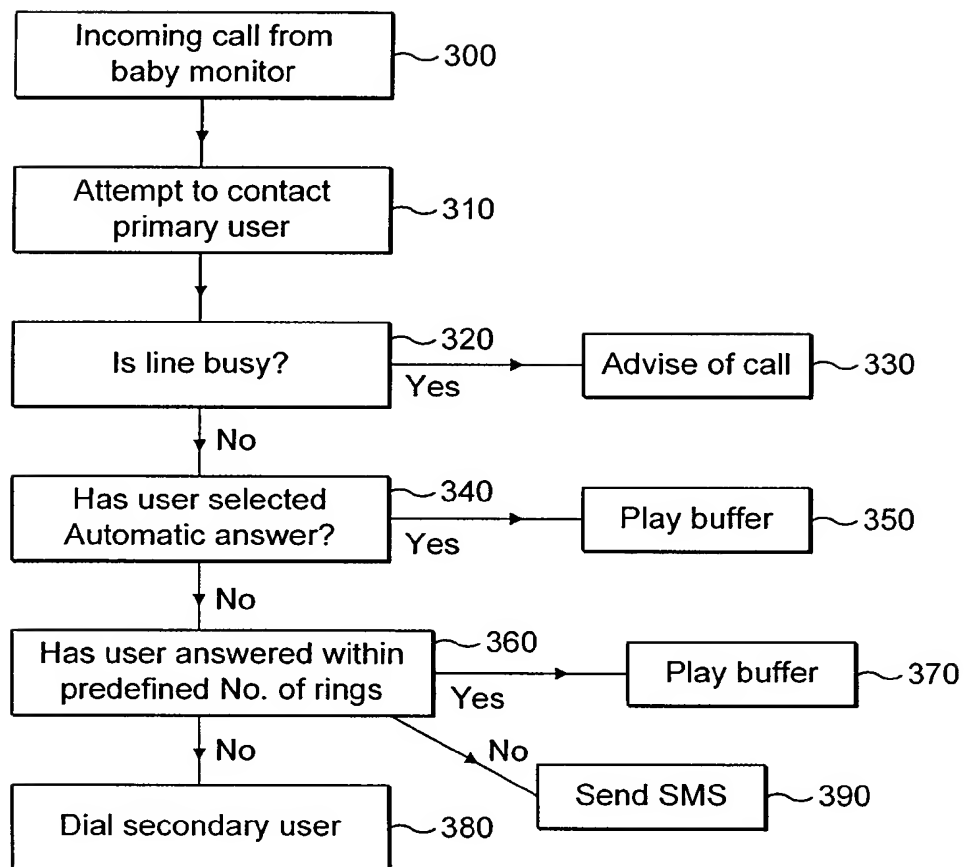Yes

No

Dial secondary user ~380

No → Send SMS ~390

FIG. 3

Activity Monitor

The present invention relates to a monitor for relaying activity of a baby or child.

Audio monitors for babies and children are well known in the art. Typical devices use radio technology to link two terminals, a transmitter and a receiver. In general, the transmitter will be placed in the same room as the baby or child and the parents or guardian will place the receiver into another room. The transmitter includes a microphone which picks up the sound from the baby and transmits this to the receiver using a radio frequency. The receiver includes a loudspeaker which reproduces the signal received by the microphone of the transmitter. Such devices allow parents to monitor whether the baby is asleep or awake without having to be in the immediate vicinity of the baby. Typically, a permanent radio link is established between the terminals and the data is forwarded across the link in real time.

Baby monitoring equipment is widely used within the home. However several problems are associated with known systems which make them unsuitable for wider use. Firstly, commercially available systems employ short range radio technology. Although this technology may be acceptable for use within an average size house, there are many situations in which the range is not sufficiently large. Conventional systems do not provide an indication of the quality of the radio link between the terminals. Therefore, the user will not be advised of whether the radio link between the terminals is active. This is potentially dangerous if the baby wakes up during a period in which the radio link is down. Furthermore, there is no way of ensuring that the person with the receiver has actually heard the signal from the

transmitter device. For example, the user may not have the receiver on his person at the time when the baby wakes or may have inadvertantly turned down the volume and so would not hear the signal. Usually, the devices

5   are sold in pairs and the users have a choice on channels on which to operate. The link between the terminals must also be permanently active. This causes an unnecessary drain on battery power since the terminals are linked during times of no activity. Finally, the terminals are

10   generally bulky and require the user to carry a device which is not compatible with any other commonly used mobile accessory.

It would be beneficial to provide a monitoring system with an extended communication range. It would further

15   be beneficial to provide a system in which the connection between the transmitter and receiver is broken during periods of no activity in order to save power. It would also be convenient to provide a system which can be combined with the electronics of a commonly used device

20   for example a mobile telephone. It would also beneficial to provide a system in which the transmitter can transmit information to a number of separate terminals. This would facilitate people in different places being able to monitor the condition of the baby and allow the user who

25   is physically closest to the baby to react. Finally it would be beneficial to provide a system which can identify whether the receiver has, in fact, heard the signal. Then, if the primary contact is unavailable, the information could be transmitted to a secondary contact.

30   Embodiments of the present invention overcome the problems of the prior art by incorporating a baby monitoring system into a mobile telephone terminal. The system comprises at least two terminals, namely a baby terminal and at least one parent terminal. The baby

35   terminal is linked to a microphone and the signals

received by the microphone are saved in a buffer. The volume of the signals picked up by the microphone are analysed and on detection of an audio signal above a predetermined volume threshold the baby terminal

5   automatically alerts the parent terminal that activity has been detected and that the baby has woken. The present invention can be incorporated with standard mobile telephone units and alerts are sent across a public radio communications network.

10   Embodiments of the present invention also include a contact list stored at the baby terminal to facilitate a second predetermined terminal to be contacted if the primary contact is unavailable at the time of the alert.

The invention is now defined in its various aspects in

15   the appended claims to which reference should now be made.

Embodiments of the present invention will now be described with reference to the accompanying drawings in which;

20   Figure 1 shows a pair of terminals used to monitor a baby.

Figure 2 is a block diagram showing the sequence of steps by which a parent is alerted that activity has been detected at the baby terminal.

25   Figure 3 is a block diagram showing the steps taken when activity is detected at the baby terminal and the system includes more than one parent terminal.

Figure 1 is a representation of a pair of mobile communication devices for use with the present invention,

30   typically mobile telephones will be used. Terminal 10 is

the baby terminal and, in use, will be placed close to child in order that sounds made by the child can be detected at the terminal. The baby monitor 10 includes a microphone 20 to detect sound signals from the baby, the signals are then forwarded to a buffer 30. The buffer 30 records the signals picked up by the microphone for a predetermined time frame. A noise level analyser 40 is linked to the buffer 30. The noise level analyser 40 analyses the audio data stored on the buffer and compares the noise level of the recorded signal with a predefined volume threshold. If the volume of the recorded sound is above the predefined threshold the system identifies that the baby has woken from sleep or is crying. The noise detection analyser 40 is linked to a call activator 50. On determination that the baby has woken up, the noise level analyser sends a signal to the call activator and triggers the terminal automatically to contact a predetermined parent terminal 70 which is listed in a pre-entered contact list 60.

In preferred embodiments of the system the microphone 20, buffer 30, noise level analyser 40, call activator 50 and contact list are incorporated within the baby terminal, however, further embodiments of the invention allow any or all of these features to be external to the device. If the features are external they should be linked to the baby terminal by a wireless or hard link. Further embodiments of the invention include multiple parent terminals.

Figure 2 is a flow diagram representing the procedure by which audio activity is detected at the baby terminal and the parent terminal is automatically alerted. At 110 the buffer on the baby monitor is cleared and reset for recording the local audio signals. The buffer records the signal received by the microphone for a predetermined time period at 120. At 130 the audio data in the buffer

is analysed by the noise level analyser. At 140 the
noise level analyser determines whether the volume of the
recorded signal is greater than the predetermined
threshold value. If the volume is below the
predetermined value then the buffer is cleared, reset and
recommences recording, however if the noise level is
above the predetermined threshold then at 150 the mobile
unit prepares to alert the parent unit that the baby is
awake and continues recording the audio signals in the
same buffer.

At 160 the baby unit automatically identifies the contact
details of the primary parent terminal in the contact
list, typically this will be a telephone number. The
audio buffer is prepared to be transmitted to the primary
contact at 170. During this period the buffer continues
to save the audio signals received by the microphone. At
180 the baby monitor attempts to contact the primary
parent terminal.

If the call is successfully connected at 190 the audio
buffer is automatically played to the primary parent
terminal. In further embodiments the primary parent may
select not to play the data from the buffer but instead
to receive the current signal received by the microphone
at the baby terminal. In further embodiments the parent
may select to receive a standard message rather than the
signal from the buffer. If the primary parent selects to
replay the buffer, the baby monitor continues to buffer
the audio signal from the baby and transmits the signal
to the parent terminal. Therefore there is a time delay
between the detection of the signal by the microphone and
receipt of the signal by the parent terminal. The parent
can terminate the call at 220. The buffer is then
cleared and the system paused before the buffer is reset
to record the current audio signals from the baby.

If the call is not successfully connected to the primary
parent terminal at 190, the baby terminal will identify
and attempt to contact the secondary parent terminal at
240. The baby monitor can be programmed with a list of
contacts and will continue to move down the list until a
call can be connected at 250.

In further embodiments of the present invention the baby
monitor may send an alert by means of a text message, e-
mail or other means at 260. This message may be sent if
a contact is not available for connection or, in
particular situations, it may be preferable to send an
SMS message rather than a voice call.

Figure 3 shows the procedure by which the baby terminal
contacts the primary parent terminal on detection of
activity. At 310 the baby telephone attempts to
communicate with the primary user. If the primary user's
line is busy at 320, for example if the user is making a
call, the user is advised of the call at 330. Typically
the user will be informed by a call waiting facility or
by a text message. In certain embodiments the user may
choose to prioritise calls from the baby terminal and the
parent terminal will automatically terminate the present
call and connect to the baby terminal or place the
present call on hold and connect to the baby terminal.

If the primary contact's line is not busy at 320 then the
parent terminal identifies whether the user has
programmed any specific instructions relating to calls
received from the baby terminal. If the primary contact
has specified that any calls from the baby terminal
should be answered automatically then the call will be
automatically connected at 340 and the buffer is played
at 350. Further embodiments of the parent terminal may
allow the user to specify that a call from the baby
monitor is automatically answered after a predefined

number of rings. In this case the call will
automatically be answered after a predetermined number of
rings and the buffer will be played. Further embodiments
allow the baby terminal to specify that if the call has
5 not been answered within a predefined number of rings
then the contact is assumed to be unavailable. In this
case the baby terminal will identify and attempt to
contact the secondary contact from the contact list at
380. Further embodiments of the invention facilitate a
10 predefined SMS message to be sent at 390 to any units
which were not available to receive incoming telephone
call.

It will be clear to those skilled in the art that the
applications of the present invention extend beyond a
15 system for monitoring audio signals. Different types of
monitoring equipment could be used to identify a change
in conditions above a predefined limit, for example
movement detected by video cameras. This application may
be particularly useful with the emergence of third
20 generation mobile telecommunications. By setting up a
movement detector and video equipment it would be
possible for a parent to be alerted when a baby moves or
when there is a disturbance in a monitored area. If the
video equipment were connected to a mobile
25 telecommunication device it would be possible for the
video data to be sent to predefined numbers across the
mobile communication network.

Claims

1. A monitor for relaying activity of a baby or child comprising a transmitter terminal monitoring the activity of the baby or child, and including means for activating the transmitter in response to the monitored activity, and a receiver for receiving signals transmitted by the transmitter, wherein the transmitter and receiver communicate via a public radio communications network.

2. A monitor according to claim 1 wherein the transmitter is a mobile telephone.

3. A monitor according to claim 1 or 2 wherein the receiver is a mobile telephone.

4. A monitor according to claim 1, 2 or 3 wherein the transmitter includes a microphone to detect audio activity.

5. A monitor according to claim 1, 2, 3 or 4 wherein the transmitter includes a camera to detect visual activity.

6. A monitor according to claim 1, 2, 3, 4 or 5 wherein the transmitter includes a buffer to record the detected activity.

7. A monitor according to claim 1, 2, 3, 4, 5 or 6 wherein the transmitter is activated when the magnitude of the activity exceeds a predefined limit.

8. A monitor according to claim 1, 2, 3, 4, 5, 6 or 7 wherein the signal transmitted by the transmitter is a SMS message, text message or e-mail.

9. A monitor according to claim 6, 7 or 8 wherein the signal transmitted by the transmitter is the activity recorded in the buffer.

10. A monitor according to claim 4, 5, 6, 7, 8 or 9 wherein the detected activity is transmitted in real time to the receiver.

11. A method for relaying activity of a baby or child comprising the steps of;
    monitoring the activity of the baby or child,
    transmitting signals in response to the monitored activity,
    receiving the transmitted signals at a remote location,
    wherein the signals are transmitted and received via a public radio communications network.

12. A method according to claim 11 including the step of transmitting the signals using a mobile telephone.

13. A method according to claim 11 or 12 including the steps of receiving the signals using a mobile telephone.

14. A method according to claim 11, 12 or 13 including the step of detecting audio signals from the activity.

15. A method according to claim 11, 12, 13 or 14 including the step of detecting video signals from the activity.

16. A method according to claim 11, 12, 13, 14 or 15 including the step of buffering the detected signals from the activity.

17. A method according to claim 11, 12, 13, 14, 15 or 16 including the step of comparing the magnitude of the

detected signals from the activity with predefined
limits.

18. A method according to claim 17 including the step of
activating the transmission when the magnitude of the
detected signals from the activity exceeds the predefined
limit.

19. A method according to claim 11, 12, 13, 14, 15, 16
or 17 wherein the transmitted signal is a SMS message.

20. A method according to claim 16, 17, 18 or 19 wherein
the transmitted signal is the buffered signal.

21. An apparatus for identifying activity in a
predetermined environment comprising;
     a detecting means for detecting signals of a
specified type,
     a recording means for recording the detected
signals,
     a means for comparing the magnitude of the recorded
signals with predefined limits,
     a first communication device for transmitting
information regarding the detected signals in dependence
on the magnitude of the recorded signals, and
     a second communication device for receiving
information from the first communication device
wherein;
     if the magnitude of the detected signal exceeds the
predefined limit the first communication device
automatically sends an alert to the second communication
device indicating that activity has been detected in the
predefined environment.

22. An apparatus according to claim 21 wherein the first
communication device includes a contact list regarding

contact details of predefined further communication
devices.

23. An apparatus according to claim 21 or 22 wherein if
the second communication device is unavailable the first
communication device automatically sends an alert to a
further communication device.

24. An apparatus according to claim 21, 22 or 23 wherein
first communication device is a mobile telephone.

25. An apparatus according to claim 21, 22, 23 or 24
wherein second communication device is a mobile
telephone.

26. An apparatus according to claim 22, 23, 24 or 25
wherein the further communication devices are mobile
telephones.

27. An apparatus according to claim 21, 22, 23, 24, 25
or 26 wherein the signals are audio signals and the
detecting means is a microphone.

28. An apparatus according to claim 21, 22, 23, 24, 25,
26 or 27 wherein the signals are visual signals and the
detecting means is a camera.

29. An apparatus according to claim 28 in which the
magnitude of the detected signals relates to magnitude of
movement detected by the camera.

30. An apparatus according to claim 21, 22, 23, 24, 25,
26, 27, 28 or 29 wherein the alert is an audio telephone
call.

31. An apparatus according to claim 21, 22, 23, 24, 25, 26, 27, 28 or 29 wherein the alert is a video telephone call.

32. An apparatus according to claim 21, 22, 23, 24, 25, 26, 27, 28, 29, 30 or 31 wherein the alert is a SMS message.

33. A method for identifying activity in a predetermined environment comprising the steps of;
    detecting signals of a specified type,
    buffering the detected signals,
    comparing the magnitude of the buffered signals with predefined limits,
    sending an alert from a first communication device to a second communication device in dependence on the result of the comparison.

34. A method according to claim 33 including the step of programming the first communication device with a contact list including contact details of predefined further communication devices.

35. A method according to claim 33 or 34 including the step of the first communication device automatically sending an alert to a further communication device if the second communication device is unavailable.

36. A method according to claim 33, 34 or 35 wherein first communication device is a mobile telephone.

37. A method according to claim 33, 34, 35 or 36 wherein second communication device is a mobile telephone.

38. A method according to claim 33, 34, 35, 36 or 37 wherein the further communication devices are mobile telephones.

39. A method according to claim 33, 34, 35, 36, 37 or 38 including the step of detecting audio signals from the activity.

40. A method according to claim 33, 34, 35, 36, 37, 38 or 39 including the step of detecting changes in audio signals from the activity.

41. A method according to claim 33, 34, 35, 36, 37, 38, 39 or 40 including the step of detecting visual signals from the activity.

42. A method according to claim 33, 34, 35, 36, 37, 38, 39, 40 or 41 including the step of detecting changes in video signals from the activity.

43. A method according to claim 33, 34, 35, 36, 37, 38, 39, 40, 41 or 42 including the step of sending the alert by a telephone call.

44. A method according to claim 33, 34, 35, 36, 37, 38, 39, 40, 41, 42 or 43 including the step of sending the alert by a SMS message.

45. An apparatus for identifying activity in a predetermined environment substantially as herein described, with reference to the accompanying drawings.

46. A method for identifying activity in a predetermined environment substantially as herein described, with reference to the accompanying drawings.

Application No:	GB 0306731.1		Examiner:	Dr Stephen Richardson
Claims searched:	1-20		Date of search:	15 July 2003

Patents Act 1977 : Search Report under Section 17

Documents considered to be relevant:

Category	Relevant to claims	Identity of document and passage or figure of particular relevance	
X	1-4, 7, 10, 17, 18	US 2003/0021424 A1	(COUTANT) see whole document.
X	1, 4-9, 11, 14-18, 20	US 6359560 B1	(BUDGE et al.) see Figures 1-3 & 5, column 2, lines 4-16, and column 5, line 31 to column 12, line 12.
X	1, 2, 4, 7, 10-12, 14, 17, 18	DE 20007647 U1	(WIESE) see WPI abstract, accession number 2001-051203.
X	1, 2, 4, 7, 10-12, 14, 17, 18	DE 19629535 A1	(BAUER) see Figure 1 and WPI abstract, accession number 1998-020035.
X	1, 3, 4, 7, 10, 11, 13, 14, 17, 18	DE 19532103 A1	(KLEMANN) see WPI abstract, accession number 1997-155642.
X	1-4, 7, 8, 10-14, 17-19	DE 10004035 A1	(MLETZKO) see WPI abstract, accession number 2001-051203.
X	1-5, 11-15 at least	DE 10123893 A1	(SCHMIDT) see Figure 1 and WPI abstract, accession number 2003-314717.
X	1, 3, 4, 7, 11, 13, 14, 17, 18	NL 9400475 A	(KONINKLIJKE) see WPI abstract, accession number 1995-372501.
X	1-3, 5, 11-13, 15 at least	JP 2001053905 A	(IWASAKI) see Figure 1 and WPI abstract, accession number 2001-612809.

Categories:

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art
Y	Document indicating lack of inventive step if combined with one or more other documents of same category	P	Document published on or after the declared priority date but before the filing date of this invention
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.

The Patent Office

Application No:	GB 0306731.1	15	**Examiner:**	Dr Stephen Richardson
Claims searched:	1-20		**Date of search:**	15 July 2003

Field of Search:

Search of GB, EP, WO & US patent documents classified in the following areas of the UKC^V:

G4N, H4K

Worldwide search of patent documents classified in the following areas of the IPC^7:

G08B, H04M

The following online and other databases have been used in the preparation of this search report :

ONLINE: EPODOC, WPI, JAPIO